

What is claimed is:

1. A method for automatically determining whether a photosensor in an apparatus is operational, the photosensor comprising a light emitter and a light detector, wherein when the
5 photosensor is operational,

the light emitter is capable of producing light for illuminating the light detector in response to a current applied to the light emitter; and

the light detector has an output voltage indicative of the applied current to the light emitter, wherein

10 the output voltage of the light detector falls in a first predetermined voltage range ($\Delta V1$) when the applied current is substantially equal to a first current value (I_0); and

the output voltage of the light detector falls in a second predetermined voltage range ($\Delta V2$) lower than the first predetermined voltage range when the applied current is substantially equal to a second current value, (I_{nom}), and wherein the apparatus comprises:

15 a control module, adapted to provide a data signal indicative of the output voltage of the light detector, said method comprising the steps of:

conveying a request signal to the control module for causing the control module to provide the data signal;

20 measuring the output voltage of the light detector based on the data signal, when the applied current is set to one of the first and second current values, for obtaining a measured voltage value, and

determining whether the measured voltage value falls in the corresponding predetermined voltage range, thereby indicating that the photosensor is operational.

25 2. The method of claim 1, wherein the control module is capable of changing the applied current, said method further comprising the steps of:

conveying a further request signal to the control module for causing the control module to change the applied current from said one of the first and second current values to another of the

first and second current values and for causing the control module to provide the data signal after the applied current has changed;

measuring the output voltage of the light detector based on the data signal for obtaining a further measured voltage value; and

5 determining whether the further measured voltage falls in the other corresponding predetermined voltage range, thereby indicating that the photosensor is operational.

3. The method of claim 1, wherein said one of the first and second current values is the first current value, and the measured voltage value is lower than the first determined voltage range,
10 said method further comprising the step of:

providing a warning signal indicating that the photosensor is non-operational.

4. The method of claim 3, wherein the provided warning signal indicates that the light detector is defective.

15 5. The method of claim 1, wherein said one of the first and second current values is the second current value, and the measured voltage value is higher than the second determined voltage range, said method further comprising the step of:

providing a warning signal indicating that the photosensor is non-operational.

20 6. The method of claim 5, wherein the provided warning signal indicates that the light produced by the light emitter insufficiently illuminates the light detector.

7. The method of claim 5, wherein the provided warning signal indicates that the light
25 produced by the light emitter is at least partially blocked by an unwanted light-absorbing material layer on the light detector.

8. The method of claim 5, wherein the provided warning signal indicates that the light emitter and the light detector are misaligned such that only an insignificant portion of the light produced by the light emitter illuminates the light detector.

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9. The method of claim 2, wherein said one of the first and second current values is the first current value, the other of the first and second current values is the second current value, the measured voltage falls in the first predetermined voltage range, and the further measured voltage value is higher than the first predetermined voltage range, said method further comprising the step of:

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providing a warning signal indicative that the photosensor is non-operational.

10. The method of claim 9, wherein the provided warning signal indicates that the light produced by the light emitter insufficiently illuminates the light detector.

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11. The method of claim 9, wherein the provided warning signal indicates that the light produced by the light emitter is at least partially obstructed.

12. The method of claim 9, wherein the provided warning signal indicates that the light emitter and the light detector are misaligned such that only an insignificant portion of the light produced by the light emitter illuminates the light detector.

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13. The method of claim 1, wherein the apparatus further having at least one further photosensor, and the control module is capable of providing information for determining whether the further photosensor is operational, said method comprising the step of:

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conveying a further request signal for causing the control module to provide a further data signal indicative of the information.

14. The method of claim 1, wherein the control module is operatively connected to a troubleshooting device comprising a software program, and wherein at least the conveying step and the determining step are carried out by the software program.

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15. The method of claim 1, wherein a saturation voltage represents a minimum voltage across the light detector when illuminated, and a third current to the light emitter represents a current at which the light detector normally becomes saturated, and the method further comprises:

setting the applied current to the third current value;

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measuring the output voltage of the light detector; and

providing a warning signal if the output voltage is greater than the saturation voltage.

16. The method of claim 15 wherein the warning signal includes an indication that the photosensor may soon become inoperative.

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17. The method of claim 1, wherein said one of the first and second current values is the first current value, and the measured voltage value is lower than the second determined voltage range, said method further comprising the step of:

providing a warning signal indicating that the photosensor may be faulty.

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18. The method of claim 1, wherein the output voltage of the light detector falls in the second predetermined voltage range when the applied current is substantially equal to a threshold current value (I_{thresh}); and further comprising the steps of

measuring the output voltage of the light detector based on the data signal when the

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applied current is set to the threshold current value for obtaining the measured voltage value, the threshold current value being less than the second current value, and

determining whether the measured voltage value falls within the second predetermined voltage range.

19. The method of claim 18, wherein the measured voltage was within the second voltage range when the applied current was set to the second current value, and the measured voltage was greater than the second voltage range when the applied current was set to the threshold
5 current value, said method further comprising the step of:

providing a warning indication that the photosensor is close to becoming inoperational.

20. A photosensor troubleshooting system for use with an apparatus comprising at least a photosensor, the photosensor comprising a light emitter and a light detector, wherein when the
10 photosensor is operational,

the light emitter is capable of producing light for illuminating the light detector in response to a current applied to the light emitter; and

the light detector has an output voltage indicative of the applied current to the light emitter, wherein

15 the output voltage of the light detector falls in a first predetermined voltage range ($\Delta V1$) when the applied current is substantially equal to a first current value (I_0); and

the output voltage of the light detector falls in a second predetermined voltage range ($\Delta V2$) lower than the first predetermined voltage range when the applied current is substantially equal to a second current value (I_{nom}), and wherein the apparatus comprises:

20 a control module, adapted to provide a data signal indicative of the output voltage of the light detector, said troubleshooting system comprising:

means, operatively connected to the control module, for conveying a request signal to the control module in order to cause the control module to provide the data signal when the applied current is set to one of the first and second current values,

25 means, response to the data signal, for obtaining the output voltage of the light detector based on the data signal so as to determine whether the obtained voltage value falls in the corresponding predetermined voltage range.

21. The system of claim 20, further comprising a software program for providing the request signal and for carrying out said determining.

5 22. The troubleshooting system of claim 20, wherein the control module is capable of changing the applied current, and wherein

the conveying means is capable of conveying a further request signal to the control module for causing the control module to change the applied current from said one of the first and second current values to another of the first and second current values and for causing the control module to provide a further data signal indicative of the output voltage of the light detector after the applied current on the light emitter has changed; and

the obtaining means is adapted to further obtain the output voltage of the light detector based on the further data signal so as to determine whether the further obtained voltage falls in the other corresponding predetermined voltage range.

15 23. The system of claim 22, further comprising a software program for providing the request signal and the further request signal, and for carrying out said determining.

20 24. The system of claim 20, further comprising a warning module for indicating whether the photosensor is operational based on said determining.

25 25. The system of claim 24, wherein when the photosensor is non-operational, said warning module is adapted to indicate at least one possible cause as to why the photosensor is non-operational based on said determining.

26. The system of claim 24, wherein said one of the first and second current values is the first current value, and the measured voltage value is lower than the first determined voltage range, said warning module is adapted to indicate that the light-detector is defective.

27. The system of claim 24, wherein said one of the first and second current values is the second current value, and the measured voltage value is higher than the first determined voltage range, said warning module is adapted to indicate at least one possible cause including that the light produced by the light emitter insufficiently illuminates the light detector.

28. The system of claim 24, wherein said one of the first and second current values is the second current value, and the measured voltage value is higher than the second determined voltage range, said warning module is adapted to indicate at least one possible cause including that the light produced by the light emitter is at least partially blocked by an unwanted light-absorbing material layer on the light detector.

29. The system of claim 24, wherein said one of the first and second current values is the second current value, and the measured voltage value is higher than the second determined voltage range, said warning module is adapted to indicate at least one possible cause including that the light emitter and the light detector are misaligned such that only an insignificant portion of the light produced by the light emitter illuminates the light detector.

30. The system of claim 24 wherein said one of the first and second current values is the first current value, and the measured voltage value is lower than the second determined voltage range, said warning module is adapted to indicate at least one possible cause including that the light detector is faulty.

31. The system of claim 20, wherein the output voltage of the light detector falls in the second predetermined voltage range when the applied current is substantially equal to a threshold current value (I_{thresh}); and wherein

the obtaining means measures the output voltage of the light detector based on the data signal when the applied current is set to the threshold current value for obtaining the measured voltage value, the threshold current value being less than the second current value, and to

determine whether the measured voltage value falls within the second predetermined voltage range.

- 5 32. The system of claim 32, further comprising a warning module whereby when the measured voltage is within the second voltage range when the applied current is set to the second current value, and the measured voltage is greater than the second voltage range when the applied current is set to the threshold current value, the warning module provides a warning indication that the photosensor is close to becoming inoperational.

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